



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/597,514	07/27/2006	Youhei Sakai	374611-000138	2199

73230 7590 01/06/2012
DLA PIPER US LLP
2000 Avenue of the Stars
SUITE 400 North Tower
LOS ANGELES, CA 90067-4704

EXAMINER

MALEKZADEH, SEYED MASOUD

ART UNIT	PAPER NUMBER
----------	--------------

1743

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

01/06/2012

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

laura.rivero@dlapiper.com
laccusptomail@dlapiper.com
cliff.keyner@dlapiper.com

Office Action Summary

Application No.

10/597,514

Applicant(s)

SAKAI ET AL.

Examiner

SEYED M. MALEKZADEH

Art Unit

1743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 18,20,21,23 and 26-38 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 18,20,21,23 and 26-38 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☒ The drawing(s) filed on 27 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Response to Amendment

Claim **18** is **currently amended**.

Claims **1-17, 19, 22, 24-25, and 35** are **cancelled**.

Claims **18, 20-21, 23, 26-34, and 36-38** are **currently pending**.

In view of the amendment, filed on 10/20/2011, following **rejections** are **withdrawn** from the previous office action, mailed on 07/20/2011.

- Rejection of the claims 18, 20-21, 23, 28-34, and 36-38 under 35 U.S.C. 103(a) as being unpatentable over Bate (US 3,165,798) in view of Kempton (US 1,386,003)
- Rejection of claims 26-27 under 35 U.S.C. 103(a) as being unpatentable over Bate (US 3,165,798) in view of Kempton (US '003) and further in view of Chapin (US 1,572,707)

New Grounds of the Rejections

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

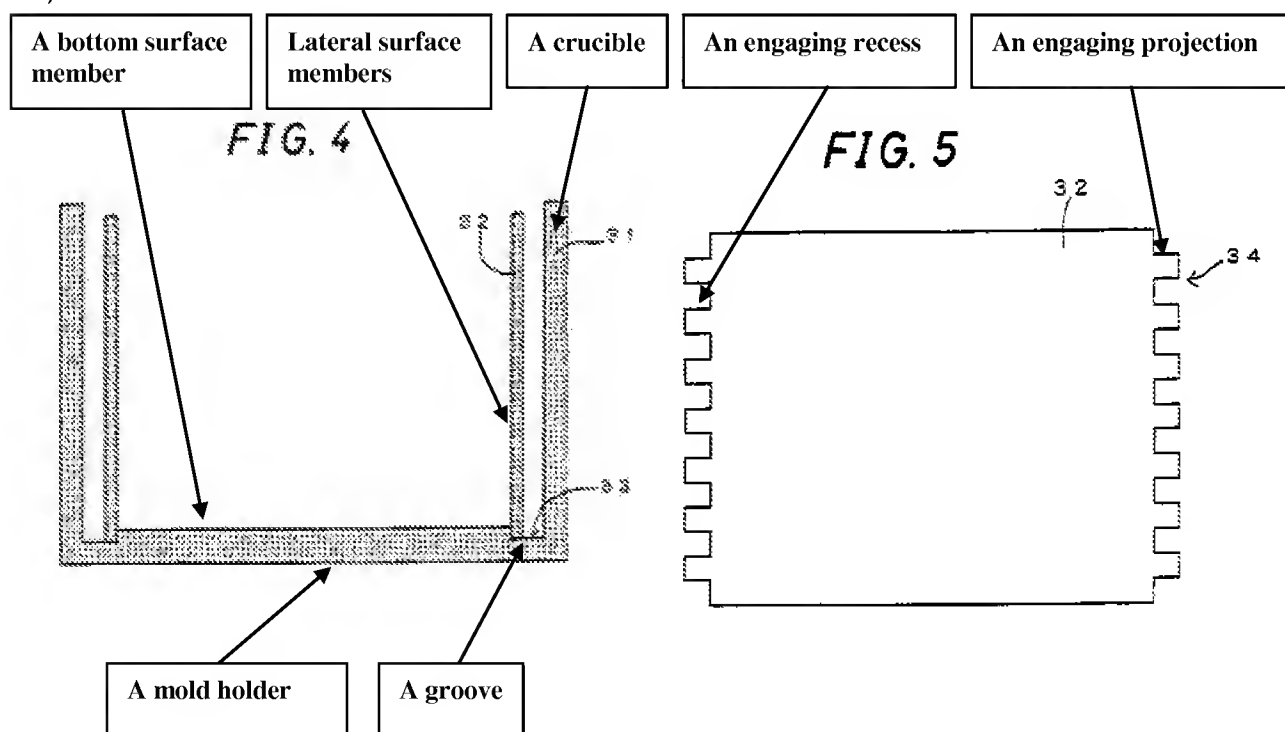
The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 18, 20-21, 23, 28-34, and 36-38 are rejected under 35 U.S.C.

103(a) as being unpatentable over Yamazaki et al (US 6,136,091) in view of Aldrich (US 2,039,872)

Yamazaki et al. (US '091) teach an apparatus for producing polycrystalline ingots in which the apparatus comprising a partition (32) made of silica which is movable in a radial direction of a crucible (31) is arranged inside the crucible (31). This partition (32) moves in accordance with a thermal expansion of the ingot at the time of solidification of the ingot thereby relaxing the strain. Moreover, a groove (33), formed in the bottom of the parallelepipedal crucible (31), permits four partitions (32) to be combined to each other. Each partition (32) has hook-shaped protrusions (34) formed on its side. By combining adjacent partitions (32) by the protrusions (34), the space defined by four partitions (32) can expand while keeping the parallel-o-pipedal shape of that space. (See column 6, lines 58- 67 and column 7, lines 1- 4 and figures 4-5)



Yamazaki et al. (US '091) further teach the projection and the recess are aligned along the lateral end of the lateral surface member and the projection and the recess of each of the first and second engaging structures are arranged in a lengthwise direction of the lateral surface member.

Moreover, Yamazaki et al. (US '091) teach by combining the adjacent partitions (32) by the protrusions (34), the space defined by four partitions (32) can expand while keeping the parallelepipedal shape of that space and the width of a gap (35) is filled with a granulated refractory (36) such as sand or granular quartz up to half of the height of the partitions (32). As a result, the size of the bottom can be kept constant in the initial stages of solidification. (See column 7, lines 4-10)

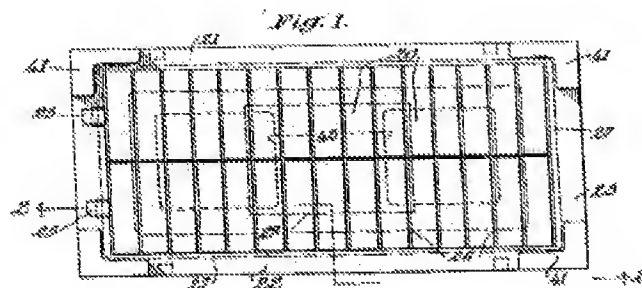
Therefore, as to **claim 18**, Yamazaki et al. (US '091) teach a mold for producing a silicon ingot comprising a bottom surface member, a plurality of lateral surface members (32) combining with the bottom surface member wherein each lateral surface member (32) comprising a first engaging structure on a first lateral end thereof and a second engaging structure on a second lateral end thereof in which one of the first and second engaging structures of one of the plurality of lateral surface members engages with one of the first and second engaging structures of another one of the plurality of lateral surface (32) members, wherein the first and second engaging structures each comprises a projection and a recess and wherein the plurality of lateral surface members (32) are in contact with an outer peripheral side surface of the bottom

Art Unit: 1743

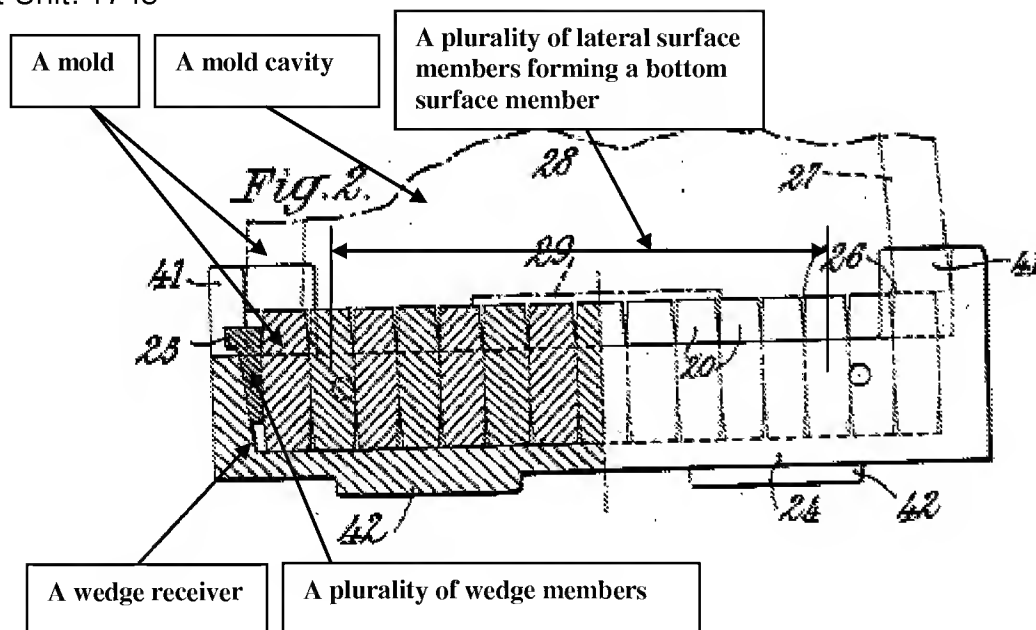
surface member and are upright so as to surround the bottom surface member, a mold holder configured for placing the bottom surface member and the plurality of lateral surface members (32) that are combined,

However, Yamazaki et al (US '091) **fail to teach** the mold holder being separated from the bottom surface member and not integral. Also, the prior art **fails to teach** a wedge receiver, instead of the gap (35), on an upper surface of the mold holder and a plurality of wedge members, instead of granulated refractory (36), positioned in clearance between the wedge receiver and outer peripheral surface of the plurality of lateral surface members (32), as claimed in **claim 18**.

In the analogous art, Aldrich (US '872) teaches a mold (27) having a casting cavity (28) supported on a stool wherein a plurality of metal sections (20) mounted in a metal frame (21) comprising sidewalls (22), end walls (23), and a base (24), wherein the frame may be of dimensions such as to accommodate the sections when assembled in a snug side-to-side relationship and the sections may be held in close contact with each other in the frame by any appropriate means as the wedges (25). (See page 2, left column, lines 36-45)



Art Unit: 1743



Therefore, as to **claim 18**, the plurality of metal sections (20) positioned between the two walls (20), together, form a bottom surface member. Moreover, Aldrich (US '872) discloses a mold base (24), as a mold holder, configured to support a mold (27) including a casting cavity (28) therein in which the mold holder (24) being provided independently from the bottom surface member plates (20), a wedge receiver on an upper surface of the mold holder (24), and a plurality of wedge members (25), respectively, positioned in clearance between the wedges receiver and outer peripheral surfaces of the plurality of lateral surface members (20).

Therefore, **it would have been obvious** for one of ordinary skill in the art at the time of Applicant's invention to change the mold for producing a silicon ingot, as taught by Yamazaki et al. (US '091), through **providing** a mold holder being separated from the bottom surface member and not being integral, as suggested by Aldrich (US '872), **since** it would have been obvious at the time of

Art Unit: 1743

Applicant's invention to separately mount a bottom surface member on top of the mold holder since such a modification has been held to be within the general skill of one of ordinary skill in the art to make unitary parts plural as a matter of obvious engineering choice. *In re Larson*, 144 USPQ 347 (CCPA 1965)

Moreover, **it would have been obvious** for one of ordinary skill in the art at the time of Applicant's invention to modify the mold for producing a silicon ingot, as taught by Yamazaki et al. (US '091), through providing a wedge receiver on an upper surface of the mold holder and a plurality of wedge members positioned in clearance between the wedge receiver and outer peripheral surface of the plurality of lateral surface members (32) **in order to** enhance a tighter and more secure fitting of the engaging structures between the adjacent ends of the lateral surface members, as suggested by Aldrich (US '872).

Further, as to **claim 20**, Yamazaki et al. (US '091) disclose the number of the plurality of lateral surface members (32) combining with the bottom surface member is four.

Moreover, Yamazaki et al. (US '091) teach the inner crucible (2) has the bottom of 55 cm square as described above, and the gap width between the inner crucible (2) and the outer crucible (1) is 30 mm. (See column 7, lines 25-32) Therefore, as to **claim 21**, the engaging structure (34) comprises one or more engaging surfaces that are substantially level with a bottom surface of the bottom surface member, and

Art Unit: 1743

further, a distance between an upper side of the lateral surface member and the engaging surface closest thereto being in a range of not less than 1 cm.

Furthermore, as to **claim 23**, Yamazaki et al. (US '091) discloses the shapes of the engaging structures (34) being provided on the sides on both sides of the lateral surface member are in a point-symmetrical relationship with a center point of the lateral surface member.

Further, as to **claim 28**, Yamazaki et al. (US '091) teaches the mold for producing silicon ingot comprises a frame-shaped member (31) arranged so as to surround the outer periphery of the lateral surface members (32) integrated by engaging the adjacent lateral surface members for constraining displacement between the lateral surface members.

Also, as to **claim 29**, Yamazaki et al. (US '091) disclose the mold further comprises a frame-shaped member (31) arranged so as to surround the outer periphery of the lateral surface members (32) integrated by engaging the adjacent lateral surface members for constraining displacement between the lateral surface members.

Further, as to **claim 30**, Yamazaki et al. (US '091) teach a pressing jig has two jig surfaces (36) respectively abutted against the outer peripheral surfaces of the two lateral surface members (32) forming the outer corner of the mold.

Moreover, as to **claim 31**, Yamazaki et al. (US '091) teach the pressing jig has a relief groove (35) provided in an area corresponding to the outer corner of the mold such that the outer corner is not directly abutted there against.

Also, as to **claim 32**, Yamazaki et al. (US '091) disclose the frame-shaped member (31) has a projection abutted against the opposed lateral surface member for constraining displacement there between provided in its inner periphery. Further, as to **claim 33**, Yamazaki et al. (US '091) disclose the engaging structure (34) comprises one or more engaging surfaces that are substantially level with the bottom surface of the bottom surface member and the frame-shaped members are respectively arranged at positions of the engaging surfaces.

Moreover, as to **claim 34**, Yamazaki et al. (US '091) teach a mold release material (36) applied to a mold inner surface comprising the bottom surface member and the lateral surface member and locking sections formed by the bottom surface member and the lateral surface members.

As to **claim 36**, Yamazaki et al. (US '091) disclose a method of manufacturing polycrystalline silicon substrate comprising a step of producing a silicon ingot by using the mold for producing a silicon ingot and a step of obtaining a polycrystalline silicon substrate from the silicon ingot.

Further, as to **claim 37**, Yamazaki et al. (US '091) teach the projections and the recesses are aligned along the lateral end of the lateral surface member. Also, as to **claim 38**, the projection and the recess of each of the first

and second engaging structures (34) are arranged in a lengthwise direction of the lateral surface member.

Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki et al. (US '091) in view of Aldrich (US '872) and further in view of Chapin (US 1,572,707)

The combined teachings of Yamazaki et al. (US '091) and Aldrich (US '872) teach all the structural limitations of a mold apparatus for producing ingots as it was discussed above, however, **fail to teach** a plurality of removable wedge receivers which are also adjustable, as claimed in **claims 26 and 27**.

In the analogous art, Chapin (US '707) teaches a molding apparatus for casting the ingots comprising two similar members (A) and two similar members (B) in which the members (A) are of a general rectangular shape being of the same width and height. The members (B) are of the same size and shape and each of these members (B) has an inwardly projecting flange (b) at each end. The lower ends of the members (A and B) are seated in a bottom member (C) provided with a recess (c) extending continuously around the inner side of the bottom member. The lower ends of the members (A and B) closely fit within the recess (c) in such a manner that they can not be moved laterally in either direction. These recesses are wide enough to accommodate not only the lower ends of the members (B) including the flanges (b), but also the lower ends of the members (A). In order to hold the outer walls of the mold firmly in place, a

Art Unit: 1743

plurality of locking bars (D) which have at opposite ends arms (d) which overlap the end portions of the members (A). The distance between the two arms of each locking bar is such as to provide a space (d') to receive a wedge (E). When the wall members (A) are placed in proper position and the locking bars (D) are applied, the wedges are in such a manner as to securely lock the members (A) in operative position. (See page 2, left column, and lines 1- 28; figures 1-2)

Therefore, as to **claim 26**, Chapin (US '707) teaches the wedge receivers (D) are removable from the upper surface of the mold holder, and as to **claim 27**, a plurality of wedge receivers (D) exists and a space between one of the plurality of wedge receivers (D) and another one wedge receiver is arranged at a position opposed to the one of the wedge receivers with the bottom surface member and the plurality of lateral surface members that are combined therebetween.

Therefore, **it would have been obvious** for one of ordinary skill in the art at the time of applicant's invention to modify the molding apparatus as taught by the combined teachings of Yamazaki et al. (US '091) and Aldrich (US '872) through **providing** a plurality of removable wedge receivers (D) which are also adjustable **in order to** prevent the formation of the strains or stresses and consequent cracking or breaking of the manufactured product caused by constraints of the outer mold walls, as suggested by Chapin (US '707)

Response to Arguments

Applicant's **arguments**, filed on 10/20/2011, with respect to claims **18, 20- 21, 23, 26- 34, and 36- 38** have been considered but **are moot** in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Seyed M. Malekzadeh whose telephone number is (571)272-6215. The examiner can normally be reached on Monday to Friday 8:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph S. Del Sole, can be reached on (571) 272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. M. M. /

Examiner, Art Unit 1743

/Joseph S. Del Sole/
Supervisory Patent Examiner, Art Unit 1743